

REMARKS/ARGUMENTS

Claims 1-25 are pending. Claims 1, 11, and 21 have been amended. The specification has been amended to correct a minor informality. No new matter has been introduced.

In the Advisory Action dated January 4, 1005, the Examiner states that "HDP-CVD is Plasma Enhanced Chemical Vapor Deposition (PECVD) process." Applicants note that this is contrary to common terminology used in the industry. It is commonly known that PECVD refers to plasma-enhanced CVD without bias sputtering, while HDP-CVD refers to high density plasma CVD with bias sputtering. See, e.g., U.S. Patent No. 6,410,446 at column 2, lines 3-6, 17-21, and 56-61; U.S. Patent No. 6,562,731 at column 1, lines 55-61; and column 2, lines 4-18. The present application also distinguishes the two CVD processes (specification at page 1, line 17 to page 2, line 19). To more particularly point out and distinctly claim the invention, Applicants have amended independent claims 1, 11, and 21 to recite performing a plasma-enhanced chemical vapor deposition (PECVD) process without bias sputtering.

Claims 1-4 and 6-10 stand rejected under 35 U.S.C. § 102(e) as being anticipated by the Applicants' admitted prior art (AAPA). Claims 11-14 and 16-20 stand rejected under 35 U.S.C. § 102(e) as being anticipated by the AAPA. Claims 5, 15, and 21-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the AAPA.

Applicants respectfully submit that AAPA does not teach performing a plasma-enhanced chemical vapor deposition (PECVD) process without bias sputtering, with tetraethylorthosilicate (TEOS) as a gas source at a temperature of about 440°C to about 520°C to deposit an oxide layer on the bottom and sidewall of the trench structure and the semiconductor substrate, the oxide layer only partially filling the trench; and removing, using a single etching process, the oxide layer on the sidewall of the trench structure substantially completely and the oxide layer on the bottom of the trench structure partially to define a remaining oxide layer as the bottom oxide layer, as recited in independent claims 1, 11, and 21.

The process as shown in Figs. 1(a)-1(c) pertains to HDP-CVD with bias sputtering. "Due to the high cost of the HDP-CVD process and the need for repeated processes, the conventional method requires substantial cost and time to form a bottom oxide layer." Specification at paragraph [0004] (page 2, lines 1-3). The process as shown in Figs. 2(a)-2(d) relates to PECVD with multiple etching processes, namely, the anisotropic etching process of Fig. 2(c) and the wet-etching process of Fig. 2(d). "However, the anisotropic etching process and the wet-etching process both need to be used in the procedure of the above method, as shown in Figs. 2(c)-(d), and render the above method more complicated." Specification at paragraph [0006] (page 2, lines 20-22).

As pointed out in the specification, "the conventional HDP-CVD process is limited by equipment and requires a higher cost. The methods according to embodiments of the present invention avoid these problems. Therefore, the present invention not only saves cost and time, but also allows the thickness of the bottom oxide layer to be controlled more easily." Specification at paragraph [0023] (page 6, lines 15-18). " By performing the PECVD-TEOS process at a temperature of about 440°C to about 520°C, preferably about 440°C to about 480°C, the reaction speed of the molecules of the TEOS will be increased so as to have a ratio of the thickness of the oxide layer 34 deposited on the bottom (bt) of the trench structure 33 to that on the sidewall (sw) of the trench structure 33 between about 1.5 and about 2.3." Specification at paragraph [0017] (page 4, line 31 to page 5, line 4). This allows the use of a single etching process to remove the oxide layer on the sidewall of the trench structure substantially completely and the oxide layer on the bottom of the trench structure partially to define a remaining oxide layer as the bottom oxide layer.

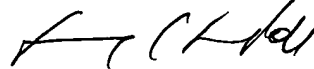
For at least the foregoing reasons, claims 1, 11, and 21, and claims 2-10, 12-20, and 22-25 depending therefrom are novel and patentable.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



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